PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P17671WO1	**FOR FURTHER ACTION** See Form PCT/IPEA/416	
International application No. PCT/SE2003/001829	International filing date *(day/month/year)* 26/11/2003	Priority date *(day/month/year)*
International Patent Classification (IPC) or national classification and IPC See Supplemental Box		
Applicant Telefonaktiebolaget LM Ericsson (publ) et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19-09-2005	20-01-2006
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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of: Cover sheet

INTERNATIONAL PATENT CLASSIFICATION (IPC):

H04L 12/14 (2006.01)
H04L 29/06 (2006.01).

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/001829

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-19 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 1-6 received by this Authority on 06/10/2005
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1/14-14/14 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/001829

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-21	YES
	Claims		NO
Inventive step (IS)	Claims	1-21	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-21	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:
D1: US 2003120499 A1
D2: WO 03047164 A2
D3: US 2002127995 A1
D4: EP 1096743 A1
D5: 3GPP TS 32.215 v4.5.0: "Technical Specification Group Services and System Aspects; Telecommunication management; Charging management; Charging data description for the Packet Switched (PS) domain; (Release 4)"
D6: 3GPP TS 29.060 v6.2.0: "Technical Specification Group Services and System Aspects; GPRS; GPRS Tunneling Protocol (GTP) across the Gn and Gp interface (Release 6)"

The cited documents represent the general state of the art.
The invention defined in claims 1-21 is not disclosed by any of these documents.
The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method and apparatus for communicating charging information in a network comprising a SGSN and a GGSN wherein charging information is transmitted in an a GTP header and the GTP header comprises a pre-determined service class extension header which is reserved for indicating service class information pertaining to a packet payload for a PDP context of a user. Thus, an exact analysis on a packet-to-packet basis is accomplished.

Therefore, the claimed invention is not obvious to a person skilled in the art.
Accordingly, the invention defined in claims 1-21 is novel and is considered to involve an inventive step. The invention is industrially applicable.

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Amended claims

1. Method of communicating charging information (CI) in a network comprising at least a serving node (SGSN) and a gateway node (GGSN) wherein charging information (CI) relating to a particular PDP context for a given mobile station is gathered in the gateway node and transmitted to a serving node (SGSN), in a GTP packet data unit comprising a header and a payload, wherein

the GTP packet data unit moreover comprises a pre-determined service class extension header which is reserved for comprising service class information pertaining to at least one IP packet payload for a given PDP context for a user and wherein the header comprises a next extension header type indicating that the pre-determined service class extension header follows.

2. Method according to claim 1, wherein the charging information (CI) at reception at the serving node (SGSN) is signalled to a charging node (SCP) associated with the serving node (SGSN).

3. Method according to claim 2, wherein the charging information (CI) is at least gathered by performing packet inspection of the transmitted packet and assigning a predefined service class to the packet.

4. Method according to claim 2, wherein the charging node signalled to is a CAMEL SCP node and the charging information is reported by means of the CAP protocol.

5. Method according to any previous claim, wherein the network is a GPRS network, the serving node is Serving GPRS Support Node (SGSN), and the gateway node is a Gateway GPRS Support Node (GGSN).

6. A GTP packet data unit comprising
a header, at least one extension header and a payload, wherein
the header comprises a next extension header type indicating that a pre-determined service class extension header follows that is reserved for comprising service class information pertaining to at least one IP packet payload for a given PDP context for a user.

7. Packet data unit according to claim 6, wherein the service class information at least relates to the service class of the payload carried by the packet data unit comprising the service class extension header.

8. Packet data unit according to claim 7, wherein the service class extension header moreover comprises a volume count pertaining to the amount of payload being transmitted in the same packet data unit carrying the service class extension header and belonging to a given PDP context.

9. Packet data unit according to claim 6, wherein the service class information relates to the service class of the payload of IP packets transmitted in other packet data units relating to the same PDP context and wherein the volume count relates to the aggregate volume of the given classified payload.

10. Packet data unit according to claim 9, wherein the payload data relates both to data transmitted upstream and downstream for a given mobile user for a given a PDP context.

11. Packet data unit according to claim 9, wherein at least two service class extension headers are comprised in the packet data unit, whereby the service class extension headers relates to different service classes.

12. Packet data unit according to any of claims 6 – 11, wherein the packet data unit is a GTP-U PDU packet and the payload is a GTP-U PDU payload.

13. The packet data unit according to any of claims 6 - 11, wherein the extension header comprises at least a main service class field and a sub-class field.

14. A gateway node (GGSN) communicating with a packet inspection and service classification system (PISC) to which IP packets may be communicated for identification of a given service class out of a number of predetermined service classes, the gateway node (GGSN) performing the steps of

receiving an IP packet (1I) from a packet data network (PDN, Gi),

extracting the IP packet payload,

receiving (3I) a service class value for the payload,

assigning the identified service class identity to a service class extension header (4I),

inserting the extension header (5I) to a packet data packet unit (GTP-PDU) carrying the payload (2I) and transmitting the packet data unit to a serving node (SGSN, Gn).

15. A serving node (SGSN) communicating with a charging node (CAMEL-SCP), the serving node (SGSN) performing at least the following steps

receiving a packet data unit (GTP-U) from a gateway node (GGSN, Gn) comprising a service class extension header (1II),

extracting a service class value (2'II) from the service class extension header,

calculating and storing the volume count from the extension header for the reported service class for a given PDP context (3'II),

transmitting the PDP payload towards a mobile station,

reporting (4II, 5II) associated values of service class and volume count to a charging node (CAMEL-SCP).

16. A serving node (SGSN) communicating with a charging node (CAMEL-SCP), the serving node (SGSN) performing at least the following steps

receiving (1II) a packet data unit (GTP-U) from a gateway node (GGSN, Gn) comprising a service class extension header,

extracting (2II) a service class value and volume count from the service class extension header,

storing (3II) the volume count from the extension header for the reported service class for a given PDP context,

transmitting the PDP payload towards a mobile station,

reporting (4II, 5II) associated values of service class and volume count to a charging node (CAMEL-SCP).

17. Serving node according to claim 15 or 16, wherein the storing (3'II, 3II) of the volume count involves accumulating a volume counter pertaining to a given PDP context.

18. Serving node according to claim 15 or 16, wherein the charging node is a CAMEL node and the reporting hereto is following CAMEL reporting procedures.

19. Serving node according to claim 15 or 16, wherein the accumulation of volume reports from classified and / or incompletely classified payload volume are maintained as long as the PDP Context is active.

20. A gateway node (GGSN) communicating with a packet inspection and service classification system (PISC) to which payload of IP packets may be communicated for identification of a given service class out of a number of predetermined service classes, the gateway node (GGSN) performing the steps of

continuously receiving (1III) downstream IP packets from a packet data network (PDN, Gi) interface for a given PDP context,

continuously receiving (2III, 3III) service class identification for the IP packets,

for those IP packets, which are incompletely classified (3III), transmitting the payload (5III) towards a serving node (SGSN), while storing (4III) the volume count and associated incomplete classification for a given PDP context,

when being able to identify (8III) a service class for a payload belonging to a PDP context for which payloads were previously incompletely classified, assigning the identified service class (9III) and the aggregate volume count (10III) for the previously incompletely classified payloads of the same PDP context to a service class extension header,

inserting (11III) the extension header to a packet data packet unit (GTP-PDU) carrying the payload and transmitting the packet data unit to a serving node (SGSN, Gn).

21. A gateway node (GGSN) communicating with a packet inspection and service classification system (PISC) to which payload of IP packets may be communicated for identification of a given service class out of a number of predetermined service classes, the gateway node (GGSN) performing the steps of

continuously receiving (1IV) upstream packet data units to a serving node (SGSN, Gn) relating to a given PDP context,

receiving (3IV) the service class for the upstream payload,

storing or accumulating (4IV) uplink volume count per service class,

when receiving (6IV) a first downstream packet from a packet data network (PDN, Gi) relating to the same PDP context,

receiving (8IV) the service class for the downstream payload,

preparing (10IV) a service class header with the given service class for the up-stream payload and the saved or accumulated volume counts,

preparing (12IV) a service class header with the given service class for the down-stream payload and the corresponding volume count,

inserting (11IV, 13IV) the extension headers to a packet data packet unit (GTP-PDU) carrying the payload (7IV) and transmitting it to a serving node (SGSN, Gn).